

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S) Burton J. Carpenter GROUP ART UNIT: 2827
APPLN. NO.: 09/746,976 EXAMINER: Luan Thai
FILED: December 21, 2000
TITLE: APPARATUS FOR CONNECTING A SEMICONDUCTOR DIE TO A
SUBSTRATE AND METHOD THEREFOR

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on May 24, 2002
Daniel D. Hill
Signature

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AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

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Sir:

Responsive to the Office Action dated January 31, 2002, and Examiner's comments with regard thereto, please enter the following amendments in the above-entitled application, without prejudice or disclaimer.

A Petition for Extension of Time to respond, with fee authorization, is submitted concurrently herewith.

IN THE CLAIMS:

Please cancel claims 3, 8, 11, and 18.

Please amend claims 1, 7, 10, 13, and 14 as shown on the marked-up and clean copies of the claims included herewith on separate paper.

REMARKS

Claims 1 - 18 were pending in the present application for patent as of the Office Action of January 31, 2002. In the Office Action of January 31, 2002, the Examiner rejected claims 1 - 6, 9, and 14 - 16 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Number 6,130,476, LaFontaine, Jr. et al., and rejected claims 7 - 8, 10 - 13, and 17 - 18 under 35 U.S.C. 103(a) as being unpatentable over LaFontaine, Jr. et al.

The examiner based the rejections of the claims on LaFontaine, Jr. et al. (U.S. Patent Number 6,130,476), but only included LaFontaine, Jr. et al. (U.S. Patent Number 6,162,660) on the PTO-892 (Notice of References Cited). The applicants respectfully request that the examiner provide an additional PTO-892 to insure that U.S. Patent Number 6,130,476 is included in the record.

Claims 1 - 6, 9, and 14 - 16 were rejected under 35 U.S.C. 102(e) as being anticipated by LaFontaine, Jr. et al.

LaFontaine, Jr. et al. (6,130,476) discloses joining a semiconductor flip chip IC to a substrate using a soldering method that, unlike some soldering methods, does not require melting the bulk of the solder to form a connection to the substrate. Using a technique that includes the application of pressure, the solder joint of LaFontaine, Jr. et al. is formed when only the surface of the solder ball and the surface of the contact

pad are melted to react with each other. Because the entire solder ball is not melted, or reflowed, neither a solder mask nor a solder flux is required.

Generally, claims 1, 10, and 14 have been amended to claim that the conductive trace is formed from copper and oxidized in the area around the conductive pad. Also, claim 1 has been amended to claim that the solder is reflowed. LaFontaine, Jr. et al. does not show or suggest oxidizing a copper trace to change the solderability of the trace. Therefore, applicants believe that claims 1, 10, and 14 are allowable over LaFontaine, Jr. et al.

Applicants believe the amendments and comments above regarding the rejection of claims 1, 10, and 14 also apply to the rejection of claims 2 - 6, 9, 15, and 16, and that claims 2 - 6, 9, 15, and 16, are allowable over LaFontaine, Jr. et al.

Claims 3 and 8 were canceled because the subject matter of claims 3 and 8 was included in amended claim 1, claim 11 was canceled because the subject matter of claim 11 was included in amended claim 10, and claim 18 was canceled because the subject matter of claim 18 was included in amended claim 14.

Claims 7 - 8, 10 - 13, and 17 - 18 were rejected under 35 U.S.C. 103(a) as being unpatentable over LaFontaine, Jr. et al. Applicants believe that one of ordinary skill in the art would not be motivated by LaFontaine, Jr. et al. to oxide a copper trace around a solder pad to change the solderability of the trace. As disclosed by LaFontaine, Jr. et al. and discussed above, the composition of the solder and pad is determined to facilitate the disclosed reaction. Because LaFontaine, Jr. et al. does not use a solder technique that requires reflowing the solder, but instead depends on a reaction between different materials under pressure to form a connection, the composition of the materials are different so that the reaction only occurs in the area where it is wanted. Therefore, applicants believe that claims 7 - 8, 10 - 13, and 17 - 18 are not obvious over LaFontaine, Jr. et al.

Applicants have reviewed the art cited by the examiner and not relied upon, and believe that the claims, as amended herein, are allowable over the cited art.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. No amendment made was for the purpose of narrowing the scope of any claim, unless Applicant has argued herein that such amendment was made to distinguish over a particular reference or combination of references.

Believing to have responded to each and every rejection contained in the Office Action mailed January 31, 2002, Applicants respectfully request the reconsideration and allowance of claims 1, 2, 4 - 7, 9, 10, and 12 - 17; thereby placing the application in condition for allowance.

Respectfully submitted,

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